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**Before the
Federal Communications Commission
Washington, D. C. 20554**

In the Matter of)
)
Allocation of Spectrum Below) ET Docket No. 94-32
5 GHz Transferred from)
Federal Government Use)

To: Mr. William F. Caton
Acting Secretary
Federal Communications Commission
Washington D.C. 20554

Comments of

The San Bernardino Microwave Society

In Response to FCC NPRM 94-32

From: Bill Burns,
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December 15, 1994

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Comments of
The San Bernardino Microwave Society
In Response to FCC NPRM 94-32

By the Membership:

Introduction

The San Bernardino Microwave Society is a non-profit organization "dedicated to the advancement of communications above 1 GHz". Our membership primarily consists of college-educated professionals employed in the high-tek electronics and defense industries. The Society was formed forty years ago to promote activity within the Amateur radio service on the microwave bands.

The 13 cm band (as it is referred to in part 97 of the FCC rules), running from 2,310 to 2,450 MHz, is the spectrum which we are concerned with here. Members of the Society have been active on the 13 cm band since the Society was first formed in April of 1955. Founding members had been active on the band in the 1940s. Our current membership is made up of Amateurs who are active in all facets of microwave communications including use of the 13 cm band.

Points of Concern

The reallocation of any spectrum away from the Amateur service is of great concern to us. In this case, the spectrum targeted for reallocation lies within the best parts of the 13 cm band. Obviously this is why this spectrum is targeted by the potential new tenants who desire use of this spectrum.

The San Bernardino Microwave Society (SBMS), as our statement of purpose indicates, is dedicated to the advancement of communications, microwave communications in particular. We recognize that many of the ideas proposed as future uses for parts of the 13 cm band are indeed advancements in communications. Many of the proposed ideas however had their roots in the Amateur service. In the case of technologies which were first used in the Amateur service, a new face has been put upon them in regards to how they could be *marketed*.

From our perspective, the real issue here is how important Amateur radio is relative to some of the proposed uses of the reallocation spectrum. By definition, Amateur radio is a not-for-profit service as we are prohibited from making money from what we do. Our reward must come from the sense of accomplishment associated with *technical advancements* or *public services* provided by the Amateur community. The act of building and operating any Amateur equipment or system prepares us for the above tasks. To some it might be "just a hobby", but to many Amateurs it is a way of life; a lifetime of dedication to technical advancement, to community, but ultimately a dedication to America.

Most Amateur organizations do not have the resources available compared to "corporate America", so it is difficult for us to defend ourselves within the political arena. The operating budget of the SBMS is just over \$1,000/year, and this is all consumed in postage and meeting hall rent. It is just simply not possible for the SBMS (or any other regional Amateur organization) to hire counsel of any kind, especially the "high Profile" firms like those in the Washington, D.C. area.

There is only one Amateur organization with the resources to at least stand-up in the face of the big-time players whose proposals are being considered here. The American Radio Relay League (ARRL) is the only Amateur organization with the clout necessary to deal with a situation like this. The League has the resources, but it also has to divide them among the many fronts where they fight for Amateur radio causes.

Aside from the ARRL, the Amateur community has only one unique source to draw from when our interests are threatened. The ultimate protector of the Amateur service is the agency under which our activity is sanctioned, and that protector is the FCC. We recognize that the FCC is responsible to all parties in this proposed change in rules. We do ask that the FCC remember that since we are prohibited from profiting from our Amateur activities, we are asked to stand in the arena and fight "with our hands tied behind our backs". In this situation, the Amateur community depends heavily on the FCC to hear and carefully consider all of our proposals and defenses.

In appendix D, paragraphs 2 and 3 of the NPRM, *the FCC accurately summarizes* the complaints of the Amateur community with regard to 13 cm Amateur band proposed spectrum reallocations. Because of existing operations and plans, any FCC solution in the 13 cm band must consider each segment (2,300-2,310, 2,390-2,400 and 2,402-2,417 MHz) as part of a unified and all-inclusive approach encompassing the entire band. As the reader proceeds, they will see the importance of such an approach to the Amateur service.

The Amateur community is concerned that the following points may be missed, and it is extremely important that they receive due consideration in this matter:

- a) The NTIA, in its original report, did not adequately determine the amount of usage of the 13 cm Amateur band.

b) Point a above is important because the instructions to the FCC and NTIA are to consider "avoiding excessive disruption" to the Amateur service.

c) The Amateur community believes that the proposed reallocations does constitute excessive disruption to the Amateur service.

d) In the case of excessive disruption to the Amateur service, the NTIA and FCC were to identify equivalent replacement spectrum to replace that reallocated.

If a compromise solution ultimately is the answer to the future of the 13 cm band, we ask that the FCC have fully considered these points first. Additional support of these arguments by the SBMS can be found in our comments filed to the NOI in June of 1994, a copy of which is attached.

Statements Supporting "Excessive Disruption" Issues

It is the position that most of the proposals will cause "excessive disruption" of the Amateur service. The definition of "excessive disruption", as it appears in the NTIA report, covers only existing Amateur uses of the 13 cm band. In its comments filed with the FCC in June of 1994, the ARRL points out accurately that:

"The effect of the proposed reallocation on existing Amateur uses of the reallocated bands is but a portion of the relevant inquiry; as well, the importance of the reallocated spectrum to the near term and long term developmental plans, particularly for the Amateur satellite service should have been reviewed. Since any reallocation will, prima facie, be related to and will affect future Amateur uses, not nearly present ones, future spectrum requirements of the Amateur and other potential services necessarily must be considered. In this connection, the expanded needs for Amateur use of 2,300-2,310, 2,390-2,400 and 2,402-2,417 MHz bands in the near term must be considered."

The SBMS agrees fully with this statement. We would emphasize that not only do the proposed reallocations disrupt existing Amateur users in the 13 cm band, but additionally these proposed reallocations will also disrupt in-progress relocation of systems from the extremely crowded lower bands as well as disrupt emerging technologies being developed for use within the 13 cm band.

The FCC, within NPRM 94-32, asks for "information regarding the degree of disruption to the Amateur service that would result if all or part of this spectrum was removed from the Amateur service". We feel that the above statements speak directly to this question, and specific items are covered below

It is very important for us to keep all or part of the segment 2,300-2,310 MHz for the following technical reasons:

a) The frequency of 2,304 MHz has been long established as a center of "weak signal" activity throughout the United States as well as other countries worldwide. Most of this type of activity occurs in the segment of 2,303.75-2,304.75 MHz.

b) A substantial number of stations around the country use this megahertz of spectrum for weak signal activities which include over the horizon and earth-moon-earth communication. These stations represent a substantial investment in time and money to construct and operate with these capabilities.

Sharing constraints for a and b above: The stations in this portion of the band use high power and/or high antenna gain to increase ERP to the levels required to allow for successful communications. Nothing is learned from or a public gain achieved when a communications fails because of limitations in power or antenna gain (within the constraints of existing law). Hunting for weak signals in an environment with where there are other unknown or unpredictable signal sources makes our task manifold more difficult.

c) In a well-established band plan, SCRRBA used the remaining spectrum in 2,300-2,310 MHz as one end of a "paired" service. This pairing of frequencies serves the same purpose a number of proposal put forth in the FCC NPRM and demonstrates how logical the SCRRBA plan is. This "paired" spectrum identified by SCRRBA in fact uses the same band segments that the proposed new services would like. SCRRBA had determined the feasibility of this pairing several years ago when it implemented its band plan.

d) The paired uses of the band segment 2,300 to 2,310 (less the weak signal segment) are being or are to be used for the following services: Narrowband and wideband single direction or bi-directional point-to-point links for analog or digital systems. These uses include audio linking, primarily targeted to relieve crowding in the lower frequency bands where most of the linking is currently done. This includes low density analog channels or high density trunk systems or video channels for efficiently moving bulk audio/video channels across densely populated areas.

Also included in the band plan is spectrum for digital linking, which includes high baud-rate data, either packetized text or machine code, as well as digitized audio and video. Again, the digital users of the lower frequency bands are looking to this paired service for linking of their data "nodes".

Sharing Constraints for c and d above: The Amateur services depend heavily on the availability of this spectrum because of its "paired" characteristics. The primary configuration of the Amateur systems in this band segment are point-to-point links, which operate continuously, and can have very wideband modulation characteristics, up to 1 MHz of bandwidth in the SCRRBA proposal. Just like in the commercial point-to-point services, high gain antennas are very desirable from a technical point of view. From a financial point of view, lower antenna gain is what is practically implemented in most systems. Signals within the bandwidth or antenna aperture of such systems will cause interference to the Amateur users of the band segment and discourage future use.

Just as the segment from 2,300-2,310 MHz is important to the 13 cm band, the segment from 2,390-2,400 MHz is also important for the following reasons:

- a) As in c and d above, existing plans depend heavily on the "paired" services enabled by this band segment.

Sharing Constraints for a above: Again, the Amateur services depend heavily on the availability of this spectrum because of its "paired" characteristics. The primary configuration of the Amateur systems in this band segment are point-to-point links, which operate continuously, and can have very wideband modulation characteristics, up to 1 MHz of bandwidth in the SCRRBA proposal. Just like in the commercial point-to-point services, high gain antennas are very desirable from a technical point of view. From a financial point of view, lower antenna gain is what is practically implemented in most systems. Signals within the bandwidth or antenna aperture of such systems will cause interference to the Amateur users of the band segment and discourage future use.

Additionally, the band segment from 2,402-2,417 MHz is important for the following reasons:

- a) The well established SCRRBA band plan designates the segment of 2,402-2,410 MHz for space, earth and telecommand stations. The satellite users are the most familiar with their operations and we will defer to their judgment regarding this band segment.
- b) The rest of this segment, 2,410-2,417 MHz is part of what SCRRBA has allocated as a wide-band channel to be used for wideband emissions like television. There is substantial activity there currently in the southern California area.

Sharing Constraints for b above: A typical installation has a transmitter and gain antenna operating continuously with an omnidirectional pattern.

ERP from such stations could easily approach 1,000 Watts. The sources of interference would be from commercial co-users in the band interfering with reception of these omnidirectional transmissions or these transmissions could capture the receivers of the commercial users.

Proposed Solutions

The SBMS recognizes that there is not a simple solution which fits all of the proposed band uses. The one thing that is clearly lacking at this point are hard facts by which we are to evaluate sharing with new tenants in the band. While there are numerous proposed uses, technical evaluation of frequency assignments, antenna apertures and emission bandwidths are lacking in most of them. We are asked to fight against a foe which we can not see.

There are statements in many of the proposals that in effect say that they will not tolerate sharing with the Amateur service. We can understand their position, but it appears to be an unrealistic approach unless their ultimate goal is for the Amateur service to be completely removed from the proposed reallocation band segments. And logically we would desire that the converse would also be true by becoming the only entity within our own segments. We therefore believe that any proposals which do not include a method for reasonable sharing with the Amateur service be disregarded and viewed as non-responsive unless the FCC finds the Amateur service replacement spectrum.

It should be pointed out that we are aware of only one potential respondent who is willing to develop a sharing plan for this spectrum. While this is not to be considered as an endorsement, the approach taken by In-Flight Phone Corporation seems on the surface to be responsive in to the sharing concept. We would hope that other suitors vying for this spectrum would take a similar approach.

We support an approach where our existing uses are protected. As stated, the frequency band of 2,303.75 to 2,304.75 MHz is well established for our weak signal systems and point-to-point systems need some portion of the 2,300-2,310 MHz band paired with some portion of the 2,390-2,400 MHz band segments. Other Amateur users in the remaining portion of the band, 2,417-2,450 MHz, would be forced to fit their uses into substantially narrower segments.

There also have been proposals to have portions of the band 2,310-2,390 MHz returned back to the Amateur service. It is our understanding that certain segments of the band have not to this date been used for the purpose for which they were taken. If our understanding is correct, we would consider any plan to trade spectrum in the proposed reallocation bands for equivalent spectrum in the 2,310-2,390 MHz band.

What we see as a non-solution to the problem would be the outright removal of the Amateur service from the proposed reallocation bands without replacement spectrum.

While there is a financial burden placed upon the Amateur service by replacing existing spectrum with new spectrum, it certainly will not come close to the cost of junking existing systems which were rendered useless because of the reallocation process.

Finally, we support an approach where our segments are protected in some fashion by a guarantee that there would be no further erosion of the band size. A primary allocation in such a band segment would help to promote activity levels now seen in the HF, VHF and the lower UHF Amateur bands. There are currently two sources of complete transceiver units for the 13 cm band, and we expect that number to expand greatly once the stigma of band segment reallocation is removed. We are not asking for a primary allocation in the entire 13 cm band, but we are asking that key portions of the band receive primary or government share status as it exists today.

Conclusion

The San Bernardino Microwave Society recognizes the monumental task ahead for the Federal Communications Commission. We appreciate the opportunity to participate in the decision-making process as it applies to our 13 cm band. The Amateur community is proud of its technical accomplishments, many of which have contributed to the technologies that now threaten its 13 cm band.

If necessary, the SBMS will back a single a single proposal put forth by the Amateur community as long as we have a voice in shaping that policy. The American Radio Relay League is in such a position because of their nationwide membership. Other regional organizations exist, like NARCC and SCRRBA, who have an intimate relationship with the California 13 cm band users, also need to participate in such a process. We would welcome the opportunity to share in the responsibility of developing a unified plan with any or all of these organizations. If the FCC wishes to form a committee to help arrive at its policy concerning Amateur 13 cm spectrum, we would also desire to participate.

The Amateur community has been a "good neighbor" in the 13 cm band (as well as all other bands that we share). Just one example of this was an intense effort by the SBMS in 1963 to avoid the use of pulse emissions (then deemed disruptive to Government radar systems) by all Amateurs in the shared bands. It would be a great travesty for the FCC to reward the Amateur community for its careful avoidance of interference by reducing the 13 cm band to the undesirable radio frequency environment in the remaining portions of the 13 cm band.

Respectfully submitted by the SBMS membership



David E. Laag, President
San Bernardino Microwave Society

SAN BERNARDINO MICROWAVE SOCIETY
c/o Bill Burns, Corresponding Secretary
247 Rebel Road,
Ridgecrest, CA 93555

6-11-94

In the matter of:)	
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RESPONSE TO: NOTICE OF INQUIRY

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
Washington, DC 20554

Re: Reallocation from Government service to non-Government service of spectrum shared with the Amateur radio service.

Dear Mr. Caton,

The San Bernardino Microwave Society (SBMS) is a forty-year old organization comprised of Amateur Radio "pioneers". This group of seventy individuals is "dedicated to the advancement of communications above 1000 MHz". Our membership has operational equipment on all of the microwave bands including 2,300 through 2,450 MHz (what we call the 13 cm band). Our founding members were active on this band shortly after it became available to the Amateur radio service.

Since that time almost fifty-years ago, the SBMS has continuously been active "pushing the envelope" of communications on the 13 cm band as well as the other microwave bands. The vigilance of its members has lead to technological advancements, many of which have been applied to the defense industry as well as well as private sector communications. Some of our members are in fact employed in the industrial community developing the emerging technologies for which the spectrum in the proposed

reassignment is to be used. It is highly probable that some of the technologies used in this new service had their roots based in brain trusts of organizations like ours across this Country.

THE SBMS IS DEDICATED TO EDUCATION

Federal Communications Commission (FCC) notice of inquiry 94-32 states that "this Commission has established the goal of creating a national information infrastructure that will provide access to all as a means of ... educating children ...". The SBMS wholly supports any effort to help to educate or make advanced forms of education available to all Americans. This is one of the primary purposes of the SBMS.

We have continuously done this on several fronts during our forty-year existence. The first order of business after the organization was formed was to publish the first "microwave manual" which was made available to all interested Amateurs. Our monthly meetings have a technical discussion period which lasts about one hour, and many of the topics covered relate to masters or PhD level topics. Always included are discussions relevant to newer members just getting started in Amateur microwave.

A majority of our members are college educated and are willing to share their educational and work experiences with the Amateur community. They are frequently invited to present technical papers or give demonstrations at various technical conferences as well as having technical articles published in related periodicals.

Much of the expertise of our membership was learned in the "field laboratory". The equipment that we build and subsequently operate is used to facilitate the experiments that we have undertaken. Our use of the microwave bands sets this form of Amateur activity apart from the more familiar forms like HF nets, DX competitions, VHF/UHF FM, packet and repeaters (although we heavily depend on these communications methods to support our experimental activities). As a great side benefit we are also able to use our equipment to communicate with one another just for the enjoyment.

Many of our members launched careers that benefited the American people using the practices and technology learned from our group. Without question, all of the prominent American radio "pioneers" were radio Amateurs, and they conducted much of their work using the Amateur radio spectrum. A substantial number of graduating electrical engineers were introduced to electronics and communications through Amateur radio. During wars fought using electronic devices, Amateurs were ready to serve this Country without the need for extensive education.

Amateur radio (and in our case Amateur microwave) is one of the best sources of high-tek education available to the American public. The takeaway of any Amateur radio spectrum, especially microwave spectrum, greatly limits the possibilities of future experimentation. The snowball effect from this will have a

definite impact on our future "brain trust" of electrical and communications engineers. This in turn has a direct bearing on Our ability, as a Nation, to compete in the world marketplace, solve technological problems on Our home shores or to be prepared for Our own defense.

The education issue is just one of the many public benefits offered by Amateur radio. A move to take spectrum away from Amateur radio is a move towards stifling the technical education of Americans.

A QUESTION ABOUT PROCEDURE

As was stated in our response to the NTIA, we "the existing users of the band" feel that little effort was made to find us. Apparently the American Radio Relay League (ARRL) was consulted to find out what activity was ongoing in the band. In its response to the NTIA, the ARRL debunked the myth that "since there are not any 13 cm repeaters listed in the repeater directories, there must not be much activity in the band" (NTIA Preliminary Spectrum Reallocation Report, page 4-38, footnote 30). The ARRL went on to "educate" the NTIA as to how, in its opinion, the band is currently used and what future activity is planned. What appears in the ARRL letter is vastly different than the text which appears in the NTIA report (page 4-18, top paragraph and page 5-14, bottom paragraph).

Another problem with how the NTIA sourced its information is that it assumed that the ARRL is the only source for information regarding activity in the 13 cm band. While the ARRL is the national organization representing Amateur radio, it certainly is not the only source for this data. Look at the number of responses to the NTIA request for public comments. Of the fifteen Amateur radio responses, thirteen came from west of the Hudson River (or Mississippi River for that matter). Many of these thirteen respondents were frequency coordination organizations whose purpose is to keep track of and organize activity in the band.

The ARRL indicated in its letter to the NTIA that it was uncertain as to the level of activity in the band. Apparently the NTIA based its conclusions about activity in the band considering only one source of information and without crosschecking this information with other available sources. This activity between the ARRL and NTIA occurred in September of 1993. Since that date there has been adequate time to find additional band use information resources.

Our point is this. The NTIA was instructed to "avoid excessive disruption of (the) existing use of Federal Government Frequencies by Amateur radio licensees" (NTIA Preliminary Spectrum Reallocation Report, page 5-14, as well as all of the other Federal documents associated with this proposed takeaway). What could be more disruptive than gutting the band, especially without asking for any input from a majority of the existing users of the band?

OUR PROPOSED ALTERNATIVE SOLUTIONS

Because of the technically-distant frequency relationship to adjacent Amateur bands (1,240 to 1,300 MHz and 3,300 to 3,500 MHz), the 13 cm band (which once was continuous from 2,300 to 2,450 MHz) must be considered as an all-inclusive unit for discussion of the adverse effects of the proposed takeaway.

While the NOI did not specifically request comments regarding 2,300 through 2,310 MHz at this time, any takeaway action (current or future) disrupts current implemented band plans and associated activities within the 13 cm band. This effectively freezes any new use or growth in the band. Of even more concern is the disruption of almost all existing uses of the band without any insight or hope as to whether the activity will ever be able to be resumed. For this reason the NTIA and the FCC must look at all-inclusive solutions for the Amateur 13 cm band.

As we discussed in our NTIA response, one of the primary uses of the band is for point-to-point linking. Our discussion covered the technical requirements relating to the frequency separation of a receiver and transmitter operating at the same geographical location. Current band plans and usage call for the pairing of the band segment of 2,390 to 2,400 (with appropriate exclusions) with the segment of 2,300 to 2,310 (again with appropriate exclusions). It is for this reason that point-to-point linking depends heavily on retaining the 2,300 to 2,310 MHz band segment. Taking the 2,300 to 3,210 MHz band segment essentially ends this use of the 13 cm band.

The other primary reason for keeping the 2,300 to 2,310 MHz band segment is the fact that the nationally/internationally recognized weak signal calling frequency 2,304 MHz sits near the middle of this segment. This point seems to have been lost on the NTIA as their chart showing frequency usage does not indicate this type of activity in this portion of the 13 cm band (table 3-6, page 3-6).

The SBMS has operated a propagation beacon near 2,304 MHz for almost twenty-years now. All of the current weak signal activity occurs within +/- 500 KHz of this frequency. Reassignment of this portion of the band renders all of the existing equipment and practices employed by weak signal operators useless. Since this has historically been one of the most prolific uses of the 13 cm band, removing 2,300 through 2,310 MHz must certainly be considered disruptive.

Obviously, we want to keep the entire band without having any of it taken away. Our primary request for consideration of band assignment would be that once the NTIA has released the segments of 2,300 to 2,310 MHz and 2,390 to 2,450 MHz, that they be assigned to the Amateur radio service as the primary user. It has already been demonstrated that we can effectively share with all of the current co-users of the band (which is not true for future co-users in the band).

As a secondary position, we would like to present the following solution to the proposed takeaway. We would like to keep the frequencies of 2,300 through 2,305 MHz in the Amateur radio service. This would accomplish several tasks which would:

1. Allow for continued and limited expansion of use of point-to-point linking by allowing for reasonable frequency separation between receiving and transmitting frequencies at single geographic locations.

2. Allow for the retention of the frequency of 2,304 MHz, which is the historically recognized national/international weak-signal calling frequency in the 13 cm band.

3. Allow for protection of services operating in the adjacent band just below 2,300 MHz.

To facilitate implementation of the NTIA and FCC reassignment, we would give the frequency band from 2,417 through 2,422 MHz back to the reassignment pool. We would still request the the remaining Amateur portions of this band be assigned on a primary-user basis.

This is just one of the possible solutions to help reduce the disruption of the Amateur use of the band. It would be appropriate for the FCC and NTIA to open a forum under which a compromise agreement could be reached between the Government and radio Amateurs. Since there is a limited amount of spectrum to pick and chose from, we are certain that an agreement could be quickly be reached. This would serve to minimize disruption to the Amateur service and provide for satisfactory implementation of an emerging technology band.

SUMMARY

We support the Commission goal of dedication to education of American children and the American people. We feel that a diminished availability of Amateur radio spectrum is detrimental to that goal. We recognize the need for emerging technology, and as a group the SBMS and Amateur radio as a whole have certainly done their share in helping to "pave a number of onramps on the information superhighway".

Additionally, we feel that the NTIA report, which is otherwise extremely thorough, has one basic flaw concerning the usage of the Amateur 13 cm band. Since there was not an adequate call for information as to the current usage of the band, the NTIA arrived at an incorrect conclusion concerning the amount of actual activity in the band.

The proposed band takeaway will cause severe disruption of current and future operations of Amateur services, both within the 2,300 to 2,310 MHz and 2,390 to 2,450 Mhz band as well as other Amateur Services supported by this band. We propose alternative plans to reduce this disruption and promote a forum which

allows Amateur input as to how spectrum is allocated.

Thank you for the opportunity to respond to the NOI concerning the 13 cm spectrum re-assignment.

Sincerely,

For the SBMS membership
David E. Laag, President